

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Original) A method for making a composition of magnetic nanoparticles which includes the step of forming said magnetic nanoparticles, each within a protein template, wherein a liquid composition of said protein templates or subunits thereof is subjected to a microporous membrane filtration step prior to formation of said magnetic nanoparticles.
2. (Original) A method in accordance with claim 1, wherein said protein template is selected from the group comprising flagellar L-P rings, microtubules, bacteriophages, chaperonins, virus capsids and members of the ferritin family.
3. (Original) A method in accordance with claim 2, wherein said protein template comprises a member of the ferritin family.
4. (Original) A method in accordance with claim 3, wherein said member of the ferritin family is selected from DPS and apoferritin.
5. (Original) A method in accordance with claim 4, wherein said member of the ferritin family is apoferritin.
6. (Previously presented) A method in accordance with claim 1, wherein said magnetic nanoparticles comprise ferri- or ferro-magnetic metals, metal alloys, M-type or spinel ferrite.
7. (Original) A method in accordance with claim 6, wherein said ferri- or ferro-magnetic metal is selected from the group comprising cobalt, iron or nickel.
8. (Original) A method in accordance with claim 6, wherein said metal or metal alloy is selected from the group comprising aluminium, barium, bismuth, cerium, chromium, cobalt, copper, dysprosium, erbium, europium, gadolinium, holmium, iron, lanthanum, lutetium, manganese, molybdenum, neodymium, nickel, niobium, palladium, platinum, praseodymium, promethium, samarium, strontium, terbium, thulium, titanium, vanadium, ytterbium, and yttrium or a mixture thereof.

9. (Original) A method in accordance with claim 6, wherein said alloy is a binary alloy or a ternary alloy.
10. (Original) A method in accordance with claim 9, wherein said binary alloy is selected from the group comprising cobalt-nickel, iron-platinum, cobalt-palladium, iron-palladium, samarium-cobalt.
11. (Original) A method in accordance with claim 9, wherein said ternary alloy is selected from the group comprising dysprosium-iron-turbide or neodymium-iron boride, iron-cobalt-platinum, cobalt-nickel platinum, or cobalt-nickel-chromium.
12. (Previously presented) A method in accordance with claim 1, wherein said nanoparticles comprise cobalt or platinum or alloys thereof.
13. (Original) A method in accordance with claim 12 wherein said nanoparticles comprise an alloy of cobalt and platinum.
14. (Previously presented) A method in accordance with claim 1, wherein said liquid composition is an aqueous solution.
15. (Previously presented) A method in accordance with claim 1, wherein the pore size of the membrane filter is in the range from about 0.02-10 μ m.
16. (Previously presented) A method in accordance with claim 1, wherein the pore size of the membrane filter is less than about 1 μ m.
17. (Original) A method in accordance with claim 16, wherein the pore size of the membrane filter is less than about 0.5 μ m.
18. (Original) A method in accordance with claim 17, wherein the pore size of the membrane filter is less than about 0.2 μ m.
19. (Original) A method in accordance with claim 18, wherein the pore size of the membrane filter is about 0.1 μ m.
20. (Previously presented) A method in accordance with claim 1, wherein the membrane filter is a disc filter.
21. (Previously presented) A method in accordance with claim 1, wherein the membrane filter is made from a material selected from the group comprising polymeric materials, metals, ceramics, glass or carbon.

22. (Original) A method in accordance with claim 21, wherein said material comprises a polymer.
23. (Original) A method in accordance with claim 22, wherein said polymer is selected from the group comprising polysulphones, polyethersulphones (PES), polyacrylates, polyvinylidenes, polytetrafluoroethylene (PTFE), cellulose, cellulose esters or co-polymers thereof.
24. (Original) A method in accordance with claim 23, wherein said polymer is polyethersulphone or a polyvinylidene.
25. (Previously presented) A method in accordance with claim 1, wherein said protein is present in said liquid composition at a concentration in the range from about 10-50mg/ml.
26. (Previously presented) A method in accordance with claim 1, wherein the pH of said liquid composition is in the range from about 5.0-7.0.
27. (Previously presented) A method in accordance with claim 1, wherein the liquid composition is subjected to an applied positive pressure during the filtration step.
28. (Previously presented) A method in accordance with claim 1, wherein said magnetic nanoparticles have a diameter (or largest diameter in the case of non-spheroidal particles) not greater than about 100nm.
29. (Original) A method in accordance with claim 28, wherein said magnetic nanoparticles have a diameter not greater than about 50nm.
30. (Original) A method in accordance with claim 29, wherein said magnetic nanoparticles have a diameter of about 20nm or less.
31. (Previously presented) A method in accordance with claim 1, wherein said magnetic nanoparticles vary in their largest dimension by no more than about 20%.
32. (Original) A method in accordance with claim 31, wherein said magnetic nanoparticles vary in their largest dimension by no more than about 10%.
33. (Original) A method in accordance with claim 32, wherein said magnetic nanoparticles vary in their largest dimension by no more than about 5%.
34. (Previously presented) A method in accordance with claim 1, wherein the formation step of said magnetic nanoparticles includes the incremental addition of sources of ions of the metal or metals to comprise or consist said magnetic nanoparticles.

35. (Original) A method in accordance with claim 34, wherein said cation and anion sources are added in sufficient amounts to provide 1-200 atoms of the cation and anion per encapsulating particle per iteration.
36. (Original) A method in accordance with claim 35, wherein said cation and anion sources are added in sufficient amounts to provide 20-100 atoms of the cation and anion per encapsulating particle per iteration.
37. (Original) A method in accordance with claim 36, wherein said cation and anion sources are added in sufficient amounts to provide about 50 atoms of the cation and anion per encapsulating particle per iteration.
38. (Previously presented) A method in accordance with claim 34, wherein the source of the metal ions is a salt of the metal or metals.
39. (Original) A method in accordance with claim 38 wherein said salt is tetrachloroammoniumplatinatate.
40. (Previously presented) A method in accordance with claim 1, wherein the formation of said magnetic nanoparticles takes place under an inert atmosphere.
41. (Previously presented) A method in accordance with claim 1, wherein the formation of said magnetic nanoparticles takes place at a temperature of at least about 24°C.
42. (Original) A method in accordance with claim 41, wherein the formation of said magnetic nanoparticles takes place at a temperature in the range from about 25°C to about 60°C.
43. (Original) A method in accordance with claim 42, wherein the formation of said magnetic nanoparticles takes place at a temperature in the range from about 35°C to about 50°C.
44. (Previously presented) A method in accordance with claim 1, wherein the method further comprises a magnetic fractionation step.
45. (Original) A method in accordance with claim 44, wherein said magnetic fractionation step comprises passing said liquid composition through a column comprising magnetic powder at a flow rate in the range from about 0.2-10ml/min⁻¹.
46. (Previously presented) A method in accordance with claim 1, wherein the encapsulating shell is functionalised with a ligand selected from the group comprising biotin, avidin, an antibody or derivative thereof, a receptor molecule, an opsonin or a metal binding ligand.

47. (Previously presented) A method in accordance with claim 1, wherein the encapsulating shell is removed or treated.
48. (Original) A method in accordance with claim 47, wherein said encapsulating shell is removed by enzymatic degradation or pH denaturation.
49. (Original) A method in accordance with claim 48, wherein the enzyme used to remove the protein is a protease.
50. (Original) A method in accordance with claim 48, wherein the pH denaturation is effected by adjusting the pH of the composition to a value below about 4.0 or above about 9.0.
51. (Original) A method in accordance with claim 47, wherein the encapsulating shell is carbonised.
52. (Original) A method for treating a liquid composition of magnetic nanoparticles, each formed within a macromolecular template, wherein said method includes the step of subjecting said composition to a microporous membrane filtration step.
53. (Original) A method in accordance with claim 52, wherein said macromolecular template comprises organic or inorganic material.
54. (Cancelled)
55. (Original) A method in accordance with claim 53, wherein said organic material is an organic macromolecule.
56. (Original) A method in accordance with claim 55, wherein said organic macromolecule is selected from the group comprising surfactants, polymers and proteins.
- 57.-60. (Cancelled)
61. (Previously presented) A method in accordance with claim 52, wherein said magnetic nanoparticles comprise ferri- or ferro-magnetic metals, metal alloys, M-type or spinel ferrite.
62. (Original) A method in accordance with claim 61, wherein said ferri- or ferro-magnetic metal is selected from the group comprising cobalt, iron or nickel.
63. (Original) A method in accordance with claim 61, wherein said metal or metal alloy is selected from the group comprising aluminium, barium, bismuth, cerium, chromium, cobalt, copper, dysprosium, erbium, europium, gadolinium, holmium, iron, lanthanum,

lutetium, manganese, molybdenum, neodymium, nickel, niobium, palladium, platinum, praseodymium, promethium, samarium, strontium, terbium, thulium, titanium, vanadium, ytterbium, and yttrium or a mixture thereof.

64.-68. (Cancelled)

69. (Previously presented) A method in accordance with claim 52, wherein said liquid composition is an aqueous solution.

70. (Previously presented) A method in accordance with claim 52, wherein the pore size of the membrane filter is in the range from about 0.02-10 μ m.

71.-85. (Cancelled)

86. (Previously presented) A method in accordance with claim 52, wherein said magnetic nanoparticles vary in their largest dimension by no more than about 20%.

87.-88. (Cancelled)

89. (Previously presented) A method in accordance with claim 52, wherein the method further comprises a magnetic fractionation step.

90.-97. (Cancelled)

98. (Original) A stable composition of magnetic nanoparticles wherein each nanoparticle is encapsulated by an encapsulating material, wherein at least 70% by weight of the nanoparticles are not in an agglomerated form and wherein the composition comprises no more than 30% free encapsulating material, based on the total weight of the encapsulating material in the composition.

99.-108. (Cancelled)

109. (Previously presented) A composition in accordance with claim 98, wherein said magnetic nanoparticles comprise ferri- or ferro-magnetic metals, metal alloys, M-type or spinel ferrite.

110. (Cancelled)

111. (Original) A composition in accordance with claim 109, wherein said metal or metal alloy is selected from the group comprising aluminium, barium, bismuth, cerium, chromium, cobalt, copper, dysprosium, erbium, europium, gadolinium, holmium, iron, lanthanum, lutetium, manganese, molybdenum, neodymium, nickel, niobium, palladium,

platinum, praseodymium, promethium, samarium, strontium, terbium, thulium, titanium, vanadium, ytterbium, and yttrium or a mixture thereof.

112.-116. (Cancelled)

117. (Previously presented) A composition in accordance with claim 98, wherein said composition is a liquid composition.

118.-119. (Cancelled)

120. (Previously presented) A composition in accordance with claim 98, wherein said magnetic nanoparticles have a diameter (or largest diameter in the case of non-spheroidal particles) not greater than about 100nm.

121.-122. (Cancelled)

123. (Previously presented) A composition in accordance with claim 98, wherein said magnetic nanoparticles vary in their largest dimension by no more than about 20%.

124.-125. (Cancelled)

126. (Previously presented) A composition in accordance with claim 98, wherein the encapsulating shell is functionalised with a ligand selected from the group comprising biotin, avidin, an antibody or derivative thereof, a receptor molecule, an opsonin or a metal binding ligand.

127.-131. (Cancelled)